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## COMPLETE SPECIFICATION.

### Improvements in Bolts and Nuts.

I, CHESBOROUGH JAMES HENRY MACKENZIE-KENNEDY, British subject of Mogilewskaia Ulitza, No. 19, St. Petersburg, in the Empire of Russia, Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to bolts and nuts and the object of the invention is to provide bolts and nuts for general purposes of such construction that, when in use, the nuts are held not so much by being threaded on the bolts as by the friction set up between two conical or partly spherical bodies tightly drawn together, such friction tending to prevent unscrewing or loosening under vibration.

My invention will best be understood by describing the same with reference to the accompanying drawings which show various examples of bolts and nuts according to my invention.

Fig. 1 is a view showing one of the simplest types of the improved bolt and nut, which nut is blank, although it could be screwed right through.

The bolt 1 has a head 2 somewhat similar to that of an ordinary wood screw and at its other end it is threaded at 3 for receiving a nut which has a conically broadened outer part or flange 5 also somewhat similar to the head of an ordinary wood screw. Both the head 2 of the bolt 1 and the part 5 of the nut are formed with a groove 6, for convenience in screwing and unscrewing. The length of the part or body 4 of the nut may be any that is found convenient but when the part 5 is similar in shape to the nut shown in Fig. 1 then the length of the part 4 is preferably not longer than two and one half diameters of the part 4 itself, in order that the general mass of the parts 4 and 5 of the nut may be the same or about the same as the mass of an ordinary hexagon nut of the same diameter and contain the same or about the same number of threads.

The bolt and the nut may be screwed together or unscrewed apart either by rotation of the nut or by rotation of the bolt, or by simultaneous rotation of both bolt and nut in opposite directions, as is found convenient and according to the type of head 2 of the bolt and part 5 of the nut.

At the end to receive the nut, the hole made in any given article to receive the bolt and nut should be made correspondingly larger to a depth somewhat greater than the depth of the nut so that, after screwing together the bolt and nut, the conical part 5 (or 4 if the part 4 is made conical) will be pressed against the body of the article in which it is contained more than the butt end 7, which may be made straight-cornered or curved-off or of any convenient form, as is desired.

The provision of the head 2 on the bolt and the part 5 or the part 4 on the nut, when made of sufficient area and convenient taper, has important practical advantages, for example:—

I. With most materials it is sufficient to only slightly press the head 2 of the bolt or the part 5 of the nut against the suitably prepared and enlarged mouth of the hole formed to receive it, to prevent a bolt or nut of round cross section

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and which even loosely fits in the bolt hole, from rotating whilst the nut or bolt is being screwed in place.

II. Even during constant vibration *etc.*, a nut or bolt which has been tightly screwed on to its bolt or nut will not unscrew because of the great friction set up between the side of the nut or bolt head and the wall of the hole by the pressure of the slope of the parts 5, 4 or 2 against the part on which they bear. 5

III. Owing to the part 4 of the nut, and in such cases as when the head of the bolt is enlarged just under its head proper or made with a form similar or somewhat similar to that of the nut (see Fig. 5), reinforcing as it were the strength of the bolt, the likelihood of its being sheared or broken across under strain is greatly diminished. 10

The head 2 of the bolt and the part 5 or 4 of the nut may have curvilinear or other convenient outlines, instead of being made of conical form; for example, they may be partly spherical. If found convenient, the part 4 of the nut may as hereinbefore stated be tapered (see the lower end of Figs. 2 and 5), becoming narrower towards its butt-end, in order that it may be tightly pressed, by screwing on a bolt, into the recess prepared for receiving it. Also, if found convenient, the parts 4 and 5 of the nut may be combined and have the same general taper towards the butt-end 7, see Figure 8 and the length of the combined parts 4 and 5 of the nut may be made any that is found convenient. If it is desired that the bolt and nut be screwed together and unscrewed by turning only one of the two parts then the part 4 of the nut or the head 2 of the bolt may be given in a well known manner any convenient cross sectional form, see Figs. 9 adapted to prevent its rotation in the hole prepared for it. 15 20

Fig. 2 shows an arrangement forming modification of that shown in Figure 1 and consisting of a bolt 1 in the form of a screwed rod having a thread 3 at each end and two nuts, one at each end. The threads 3 of the bolt 1 may be alike, or different to each other both in character and direction, as desired. Instead of the nuts shown in this figure, nuts such as shown in Figures 3, 4, 6 and 8 or any other convenient shape of nuts having a tapered portion may be used in conjunction with the screwed rod bolt 1. 25 30

Figures 3 and 4 show arrangements wherein the nuts and bolts are formed in a known manner with ears 8 and 10 respectively.

The ears 8 and 10 with which the nuts and bolts may or may not be provided as desired, may be of any convenient shape and be formed with one or more openings 11 according to the purpose for which it is desired to use them. Instead of the ears 8 and 10 the bolts and nuts may be provided with hook-like or any other desired projection, such projection being suitable or not for having articles attached to it. 3 3

Figures 6 and 7 show further modifications wherein the parts 4 and 5 of the nut, which is screwed through although it could be otherwise, are combined and have the same general taper towards the butt-end 7. In Figure 6 the part 2 of the bolt 1 and the part 5 of the nut are shown with hexagon projections 10 and 8 instead of ears; these projections however can be of any other form. In Figure 7 the part 2 of the bolt 1 is shown with a slightly rounded surface formed with a groove 6. 4 4

The parts 4 and 5 of the nut shown in Fig. 8 which is not screwed through although it could be if desired, are combined and have the same general taper towards the butt-end 7, while the head 2 of the bolt 1 is made of similar form to the nut. Both nut and head 2 are formed with grooves 6, but if found convenient any suitable arrangement may be used instead.

Figure 9 shows some of the known convenient forms which may be given to either the nut body 4 or bolt head 2 while preferably preserving a round formation at the parts visible from outside, although this can be otherwise in order to allow the bolt and nut being screwed together or unscrewed by turning only one of the two, the other being prevented from turning by the shape given to it.

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The length of the part 4 of the nut is conveniently although not necessarily, made considerable in order to ensure for this nut a great exterior frictional surface and secondly to enable bolts of one and the same length to draw together parts of various thickness.

5 The angle or angles of the taper given to the parts 2 of the bolt, and 4 and 5 of the nut, should be such, and the parts themselves should be made of such area, that after they have been screwed well together in the article in connection with which they are used, such friction will be set up between the parts 2, 4 and 5 and the walls of the recesses into which they fit, as to counteract, under  
10 the more or less ordinary conditions of usage, any chance of the nut or bolt unscrewing when undesired, even if subjected to vibration, *etc.*, without the use of any auxiliary power to keep the parts 2, 4 and 5 pressed to the article in which the bolt and nut is used, save their being screwed up tight in the first instance. However the improved bolts and nuts may be used with any convenient  
15 device serving to ensure against any possibility of their unscrewing when undesired.

In the part 4 of the nut the recess or hole containing the female-thread may extend throughout its whole depth or not as found convenient, and in screwing together the bolt and nut, the bolt may be drawn through the whole depth or  
20 only part of the depth of the recess or hole, as is desired.

The bolt may be threaded through its whole length up to the head 2 or not, as is found convenient.

The bolt may be of any convenient diameter and length and may be either straight or bent or otherwise wrought to any design for example bent to the form  
25 of a clamp as found desirable.

The bolts and nuts shown in Figures 1, 2, 3, 4 and 5 may be more suitable for use with wood and such like materials whilst the bolts and nuts shown in Figures 6 and 7 may be more suitable for use with metals.

The extension of the head of the bolt or screw shown in Fig. 5 must not be  
30 made with a shoulder. Nuts according to this invention must not be made having the parts 4 split because experience has proved such a split does not allow the nut to hold with sufficient security.

Figure 10 illustrates a joint with wooden parts, effected by means of suitable bolts and nuts according to this invention. 12 and 13 are wooden beams and  
35 14 is a thin metal band.

Figure 11 illustrates a joint with only metal parts, effected by means of suitable bolts and nuts according to this invention. 15 is a section of railway rail and 16, 16 fish-plates, while 17 and 18 are a bolt and nut similar to the bolt and nut, shown in Figure 6.

40 I am aware that for connecting the overlapping ends of corrugated metal sheets it has already been proposed to employ a bolt having a conical head adapted to burr the edges of the hole through which the bolt is passed; a bolt with a conical head for securing together the parts of a metal bedstead has also been proposed. Belt fasteners and metal buttons have also been proposed, each con-  
45 sisting of a short bolt (having a conical head in the case of the belt fastener) and a nut having a conical flange or disc like part from the inner side of which a conical internally screwed boss extends. It has also been proposed to secure the bristle lags of a rotary brush by double screws each consisting of an ordinary screw with a tapered head and an internally screwed tube having a tapered head;  
50 and, handles or the like securing means consisting of a loop or eye with a screwed shank and a headed or flanged nut fitting thereon have also been proposed.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, I declare that what I claim is:—

65 1. Bolts and nuts so constructed with conical or curved portions or heads that

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when in use the nuts or bolts are held by the friction set up between two conical or partly spherical bodies tightly drawn together.

2. Bolts and nuts constructed substantially as hereinbefore described with reference to and illustrated by the accompanying drawings.

Dated this 28th day of March, 1911.

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C. J. H. MACKENZIE-KENNEDY.

Reference has been directed in pursuance of Section 7, Sub-section 4, of the Patents and Designs Act, to Specifications No. 1247 of 1869, No. 4791 of 1883, No. 6255 of 1887, No. 13,243 of 1892, No. 23,778 of 1894, and Nos. 1425, 12,207 and 17,334 of 1905.

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Fig. 1.

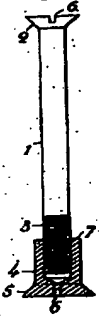


Fig. 2.



Fig. 3.

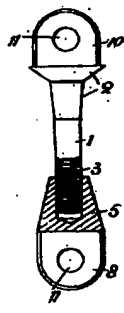


Fig. 4.

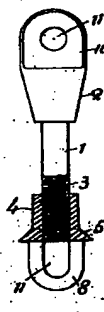


Fig. 5.

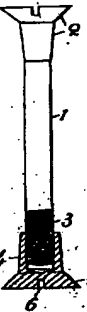


Fig. 6.

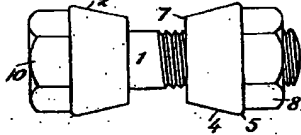


Fig. 7.

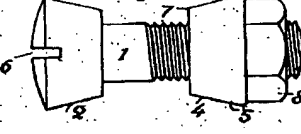


Fig. 8.

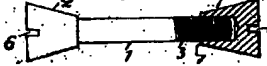


Fig. 9.

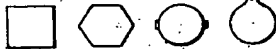


Fig. 10.

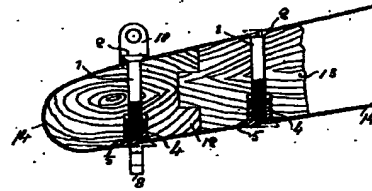
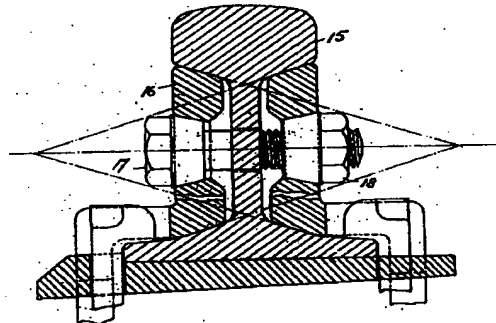
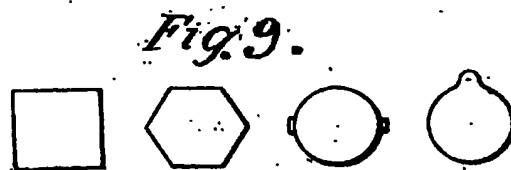
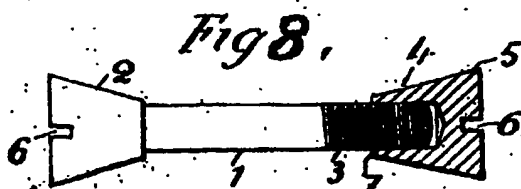
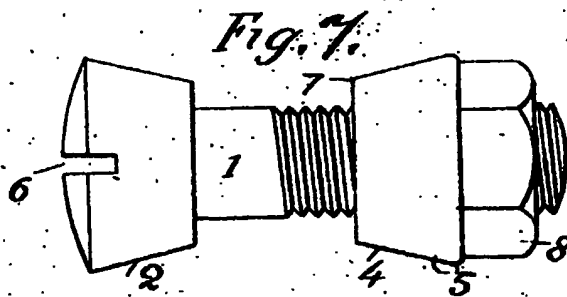
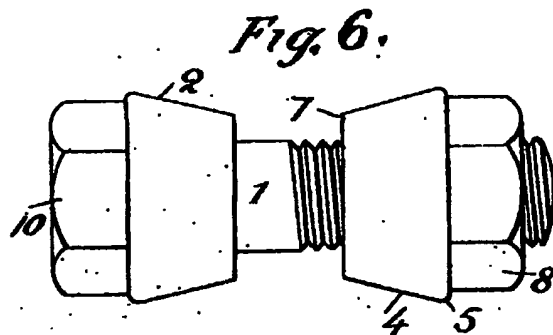
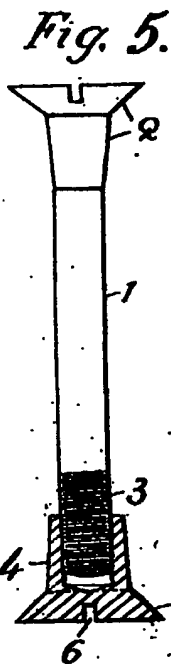
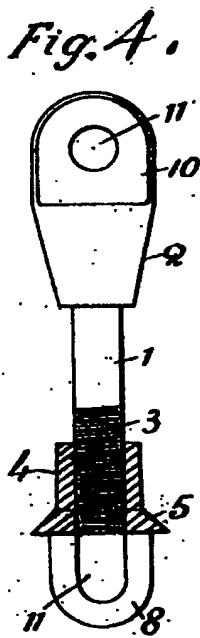
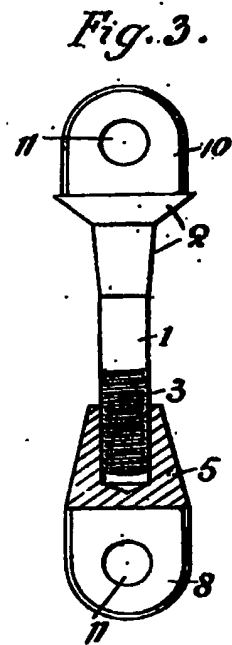
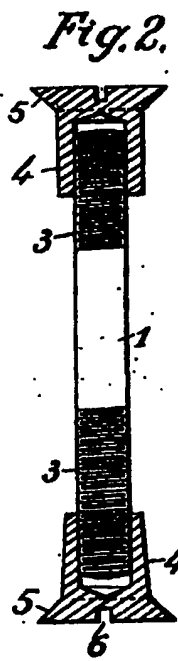
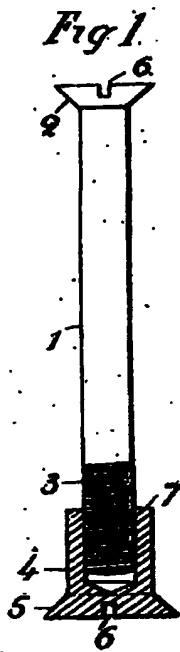


Fig. 11.



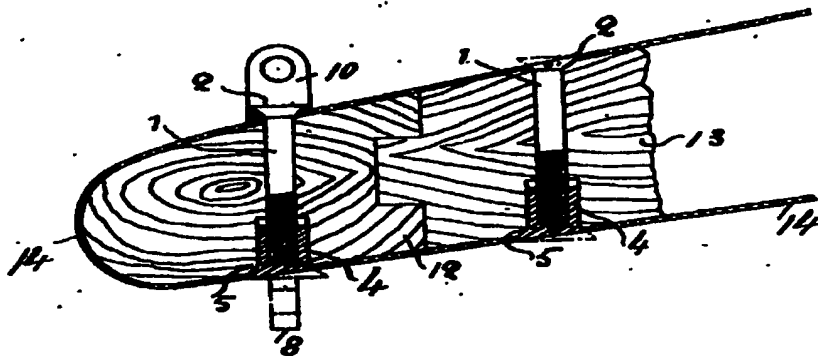
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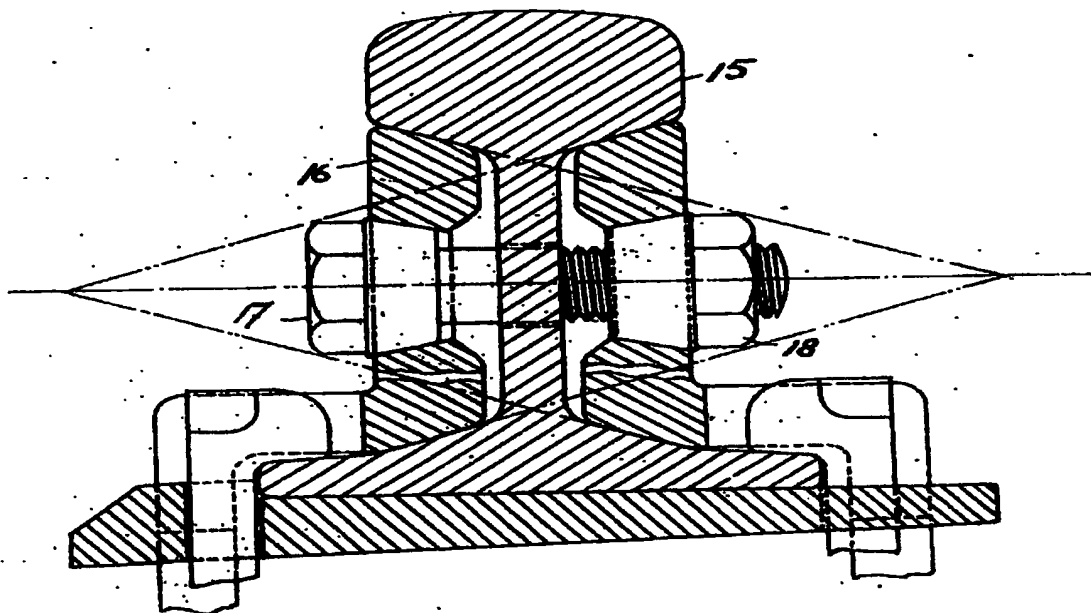


[This Drawing is a reproduction of the Original on a reduced scale.]

*Fig. 10*



*Fig. 11.*



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